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5.56-MM SUBMACHINE GUN, XM177E2

Interim Report

June 1968

ARMY MATERIEL COMMAND

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SUMMARY

This report describes the developmental XM177E2 5.56-mm submachine gun. Based on the M16A1 rifle, the XM177E2 has a shorter barrel, a different type of flash suppressor, and a telescoping stock.

RELATED TIR

12-60 TIR CD-7 Infantry Weapons

5.56-MM SUBMACHINE GUN, XM177E2

A submachine gun chambered for the 5.56-mm cartridge has been developed for the US Army Weapons Command. Called XM177E2, it is a modified version of the M16A1 5.56-mm rifle, differing only in that it has a shorter barrel, a different type of flash suppressor, and a telescoping butt stock.

A gas-operated and air-cooled weapon fed from a 20-round magazine, the XM177E2 can be fired from the shoulder or the hip. Semiautomatic or full-automatic fire can be delivered by the positioning of a selector lever on the left side of the lower receiver directly above the pistol grip.

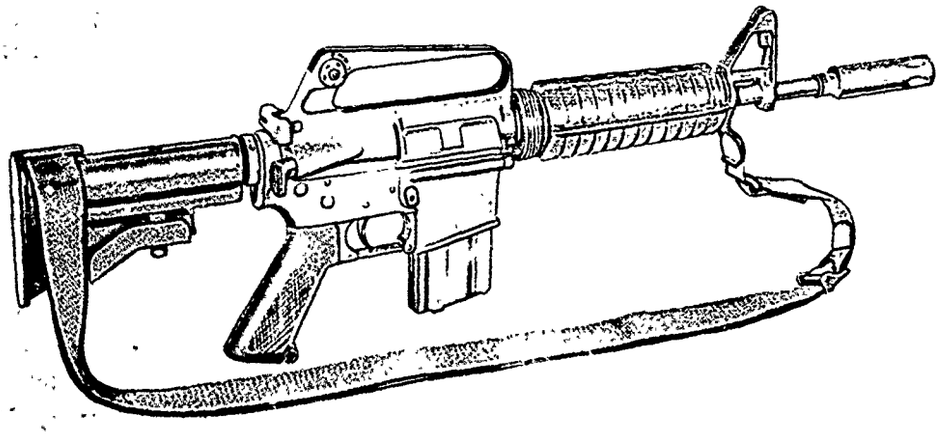
The main components of the weapon are the upper and lower receiver, bolt carrier group, barrel and barrel extension, trigger and hammer assemblies, handguard, sights, flash suppressor, and butt stock. Air-cooled, the 11.5-inch barrel is surrounded for the major portion of its length by a heat-resistant fiberglass material that acts as a handguard. The two-position butt stock is extended or closed by means of a release lever and lockpin. Similar to the flash suppressor of the M16A1, the modified suppressor of the XM177E2 is smoothly cylindrical, gas vents being machined in the cylinder near the front end. Both the front and rear sights are adjustable.

The gun is loaded by inserting a magazine in the magazine feedway in front of the trigger guard. When it is loaded with the bolt closed, the bolt is retracted by means of the charging handle and allowed to move forward under the impetus of a spring, thereby stripping a cartridge from the magazine and seating it in the chamber. If the weapon is loaded with the bolt in the open position, pressing on the upper portion of the bolt catch will allow the bolt to go forward, chambering a round.

The firing cycle is initiated by pressing the trigger. This action allows the hammer to strike the firing pin, which in turn strikes the cartridge primer, detonating it. Ignited by the primer, the powder charge drives the bullet through the barrel.

A small portion of the powder gases passes through a gas port in the top of the barrel and into a gas tube. This tube directs the powder gases into the bolt carrier key between the bolt and bolt carrier, moving the carrier and the bolt to the rear.

Several actions take place during the rearward movement of the carrier and the bolt. The camming pin rotates, unlocking the lugs of the bolt from the lugs of the barrel extension. The extractor, which is attached to the bolt, grips the rim of the cartridge case and holds it firmly against the bolt as the bolt



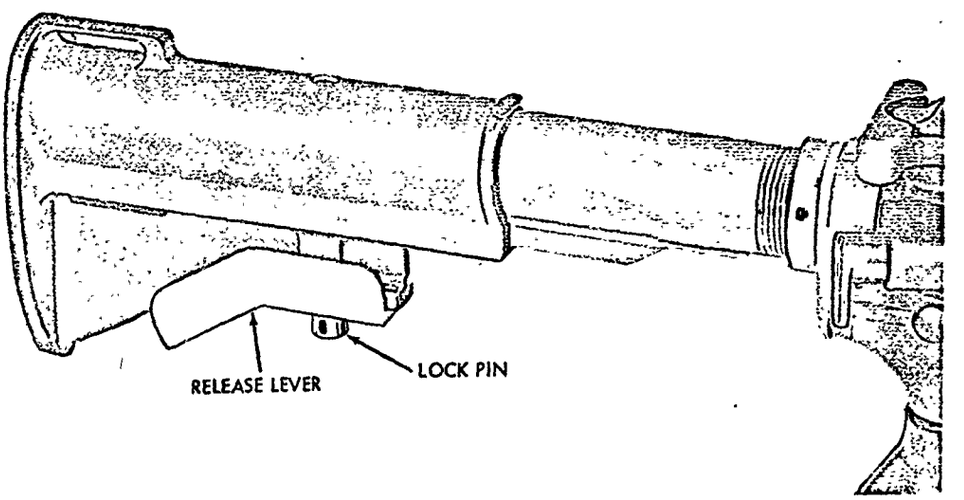
XM177E2 5.56-MM SUBMACHINE GUN

extracts the case from the chamber. During this rearward motion of the bolt, the ejector spring is held compressed. Released as the cartridge case mouth clears the ejection port, the ejector spring expels the case from the weapon. The hammer, cocked during this rearward movement of the bolt, is forced down into the receiver, whereupon the hammer spring is compressed, and the hammer slips off the disconnect and is caught by the nose of the trigger. If the selector lever is in the semiautomatic position, the trigger must be pulled again to fire another shot.

As the bolt carrier clears the top of the magazine, the magazine follower and spring push a new round up and into the path of the bolt. Having been compressed by the rearward-moving bolt, the action spring expands, driving the buffer assembly forward with enough force to move the bolt carrier and bolt forward.

On the forward stroke of the bolt carrier, the face of the bolt strips a round from the magazine. At the same time, the extractor claw grips the rim of the cartridge and the ejector is compressed. When the bolt carrier enters the last half inch of its forward movement, the bolt cam pin emerges from the guide channel in the upper half of the receiver and moves along the cam track, rotating the bolt counterclockwise into its locked position. The weapon is then ready to fire and the cycle begins again.

The above description of the weapon's functioning refers to semiautomatic firing. When the selector lever is placed in the full-automatic position, the center cam of the selector prevents the disconnect from engaging the hammer.



TELESCOPIC BUTT STOCK OF XM177E2 5.56-MM SUBMACHINE GUN

The automatic sear catches the upper hook of the hammer, holding the hammer cocked until the bolt carrier moves forward and strikes the top of the sear, releasing the hammer. If the trigger is released, the hammer moves forward and is caught by the nose of the trigger, thus ending the burst of fire until the trigger is again depressed.

A disconnect is necessary to achieve seamiautomatic fire simply because of the high cyclic rate of the weapon. Unlike the relatively slow rate of fire of the M3 submachine gun with which a trained gunner can fire single shots by quickly releasing the trigger, the XM177E2 cyclic rate is too fast for human reaction time. Without the disconnect feature, even a trained gunner would be unable to fire a burst of less than three or four rounds.

Performance characteristics of the XM177E2 are identical to those of the M16A1 rifle in all important respects. Muzzle velocity, usually measured in test fixtures and therefore somewhat of an approximation, drops about 25 feet per second for each inch of barrel length reduction. Muzzle velocity of the M16A1 is approximately 3,150 feet per second, but that of the XM177E2 is only 2,770, both velocities being achieved with the M193 55-grain ball cartridge. The cyclic rate of fire of the M16A1 is from 700 to 800 rounds per minute, not appreciably different from the cyclic rate of 650 to 900 of the XM177E2. Although a shorter barrel and the resultant lower velocity would change the midrange trajectory to a degree and the shorter sight radius would make precision aiming slightly more difficult, such differences are negligible. The gun is being field tested in Vietnam but no date has been scheduled for type classification.

TENTATIVE PRINCIPAL CHARACTERISTICS

Model	XM177E2
Type	submachine gun
Caliber	5.56 mm
Ammunition	5.56-mm ball and tracer
Method of operation	gas
Weight	
Empty	6.1 lb
Loaded (with sling and 20-round magazine)	6.8 lb
Length, overall	
Stock closed	29.7 in
Stock extended	33.0 in
Barrel length	
Without flash suppressor	11.5 in
With flash suppressor	15.0 in
Sights	
Front	adjustable click-type post, each click equal to 2.8 cm laterally per 100 m of range
Rear	adjustable flip type, normal setting 0-m to 300-m range, long-range setting 300 to 500 m, windage 2.8 cm per 100 m of range
Performance	
Muzzle velocity	2,770 fps
Muzzle energy	890 ft-lb
Peak chamber pressure	52,000 psi
Cyclic rate	650 to 900 rd/min
Maximum rate of fire	
Semiautomatic	45 to 65 rd/min
Automatic	150 to 200 rd/min
Sustained rate of fire	12 to 15 rd/min
Maximum range	2,500 m
Maximum effective range	350 m

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13. ABSTRACT

A modified version of the M16A1 5.56-mm rifle, the XM177E2 5.56-mm submachine gun has a shorter barrel, a different type of flash suppressor, and a telescoping butt stock. Gas-operated, air-cooled, and fed from a 20-round aluminum box magazine, the XM177E2 is capable of semiautomatic or full-automatic fire, selectable by a manual lever. Loaded with a full magazine, the weapon weighs 6.8 pounds, has a cyclic rate of fire of from 650 to 900 rounds per minute, and has a muzzle velocity of 2,770 feet per second.

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